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Interaction of l-leucyl-l-leucyl-l-leucine thin film with water and organic vapors: Receptor properties and related morphology

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Abstract

The ability of highly ordered tripeptide structures to keep or change their morphology in contact with organic vapors was studied. A thin film of tripeptide l-leucyl-l-leucyl-l-leucine (LLL) was prepared having microcrystals and nanocrystals on its surface, which are stable upon vacuum drying but become objects of selective morphology change after a contact with vapors of organic solvents. Fine separate LLL crystals and their agglomerates of submicron and larger dimensions were observed by atomic force microscopy and scanning electron microscopy. After saturation with guest vapors, these crystals can remain intact or change their morphology with the increase in size or complete destruction depending on the guest molecular structure. The crystals completely lose their shape after the binding of pyridine vapors. The other studied guests produce much smaller transformations or have no effect on crystal morphology despite being sorbed by solid LLL, which was shown using quartz crystal microbalance sensor. The observed size-exclusion effect for guest sorption by LLL was found to be broken by the same guests that can change the initial crystal shape. This helps to explain the morphology changes of LLL crystals after the guest sorption and release.

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Keywords

Atomic force microscopy, Quartz crystal microbalance, Scanning electron microscopy, Sorption, Supramolecular receptors, Surface morphology, Tripeptide